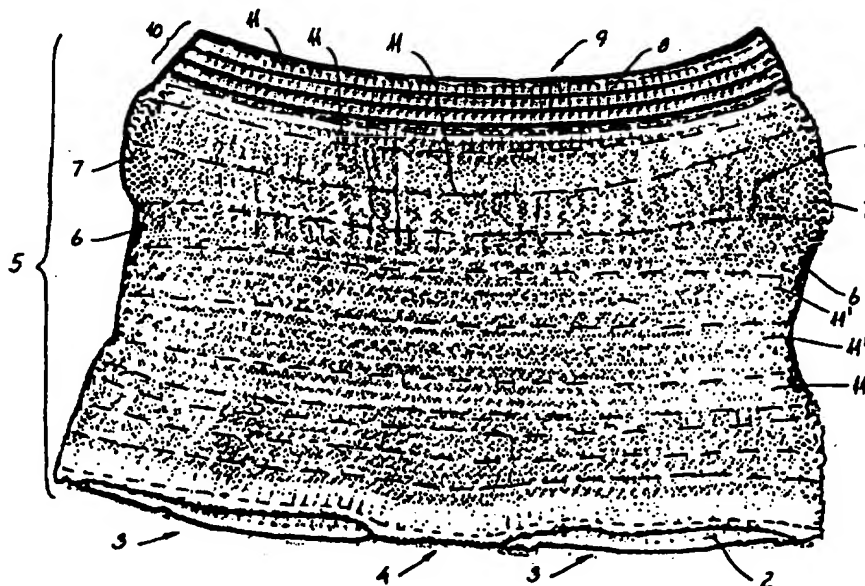




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup>:</b> <b>A41B 9/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 96/13989</b> <b>(43) International Publication Date:</b> 17 May 1996 (17.05.96)
<b>(21) International Application Number:</b> PCT/DK95/00434 <b>(22) International Filing Date:</b> 2 November 1995 (02.11.95) <b>(30) Priority Data:</b> 1269/94                      2 November 1994 (02.11.94)      DK <b>(71) Applicant (for all designated States except US):</b> TYTEX A/S [DK/DK]; Industrivej 21, DK-7430 Ikast (DK). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> KRISTENSEN, Johannes [DK/DK]; Laesoegade 3, DK-7430 Ikast (DK). <b>(74) Agent:</b> PATRADE A/S; Store Torv 1, DK-8000 Aarhus C (DK).		<b>(81) Designated States:</b> AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

**(54) Title:** ONE-SIZE PANTY BRIEFS**(57) Abstract**

Disclosed are panty briefs, primarily intended for the fixation of a diaper. Interknitted in the waist portion (5) of the briefs are elastic threads (11, 11') generally extending in the circumferential direction of the waist portion. These elastic threads produce an elastic contraction in the circumferential direction of the briefs in order to establish a tight fit depending on the size of the wearer. In order to obtain the best possible fit for large and small wearers, the elastic threads (11) only form meshes with the base web of the briefs along a portion of the extension of these threads (11) in the circumferential direction of the briefs. This causes the waist portion of the briefs to appear with undulations allowing improved adaptation to large and small wearers without the risk of irritating local pressures.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

## ONE-SIZE PANTY BRIEFS

The present invention relates to panty briefs comprising a waist portion for enveloping a wearer, said waist portion being knitted together at an edge area in the bottom of the briefs in order to form a crutch area separating two non-united sections of the edge areas  
5 at the bottom of the briefs in order to form leg openings, said briefs being produced from a base web with elastic threads, which are distributed across the height of the waist portion, and which extend generally in the circumferential direction of the waist portion in order to provide an elastic contraction in the circumferential direction of the briefs.

10

It is known from the prior art to produce panty briefs by knitting with different patterns in order to obtain the best possible fit without the need of a finishing treatment of the briefs. In order to obtain a fit and an elastic contraction, it is possible to use different mesh types, tighter knitting and the like in stead of interknitting the elastic threads. The  
15 present invention relates to such panty briefs wherein elastic threads are used, and to a lesser extent the mesh type, for providing the fit.

20

While several solutions have been proposed in order to obtain a fit that makes the briefs as widely applicable as possible, so-called one-size briefs, the known briefs are associated with certain disadvantages.

25

In order to obtain briefs that will fit a relatively small wearer firmly, a large number of elastic threads are required in the circumferential direction. However, such briefs result in a very high contractive stress on a relatively large wearer. If the briefs are to fit the  
25 large wearer, they will be much too loose for a relatively small wearer. Especially in diaper fixation briefs this is a problem. In such briefs relatively strong elasticity is required in order to obtain satisfactory fixation of a diaper. Consequently, the larger wearer will have a very high risk of strong local contractive stress adjacent the elastic threads. This leads to irritations and may also hamper free blood circulation.

30

Solutions to the formation of one-size briefs have been proposed wherein a tack extending partially into the briefs is formed at varying distances across the height of the waist portion and at the lateral seams of the briefs. This tack in the waist portion at certain points at intervals across the height of the waist portion may be broken. Breaking a  
5 smaller or larger part of the tack makes it possible to produce briefs that fit a large or a small wearer. However, the briefs will comprise a relatively large amount of material being concentrated at the lateral seams. This will naturally cause small wearers to feel uncomfortable due to the elastic forces in the circumferential direction, which will press the folded amount of material against the wearer with high local contractive stress.

10

There is further a risk that a user may break an excessive part of the tack. This will cause the briefs to be unsuited for use by a relatively small wearer since too feeble elasticity occurs in the circumferential direction of the finished briefs. This will especially lead to problems in diaper fixation briefs.

15

Briefs according to the present invention may be seen as a further development of flat knitted briefs described in US patent No. 3,656,324. Materials, knit types, mesh sizes, embodiments etc. disclosed in the US patent may consequently also be used in connection with the production of briefs according to the present invention. Alternatively, the  
20 briefs according to this invention may also be manufactured by circular knitting.

It is the object of the present invention to remedy the disadvantages of prior art briefs, especially prior art one-size briefs, and in particular briefs for diaper fixation, by disclosing briefs of the type mentioned in the introduction that may be manufactured with  
25 an elasticity permitting it to be used by relatively small and relatively large wearers without causing local contractive stress and without fitting too loosely.

This is obtained according to the present invention by briefs being characterised in that at least part of the elastic threads only form meshes along a portion of the extension of  
30 said threads in the circumferential direction of the briefs so as to form intermediate por-

tions in which the base web is pressed in an outward direction for the formation of undulations.

5 Finished briefs in which part of the elastic threads are meshed with the other base web meshes of the waist portion of the briefs only over a portion of their extension will appear with undulations. The elastic threads distributed across the height of the waist portion will contact those areas, oriented in the vertical direction of the waist portion, with which they are interknitted. Owing to this the intermediate areas, which are not in contact with the elastic threads, will be pressed in an outward direction so that the briefs  
10 appear with the undulated waist portion, in which the undulations are oriented with their longitudinal direction in the vertical direction of the briefs. In the direction perpendicular thereto, i.e. in the circumferential direction, the undulations will provide sufficient elasticity for safe maintenance of the briefs when placing the briefs on a small wearer. If the briefs are worn by a large wearer, the undulations will, in popular terms, be straight-  
15 ened out. This will cause increased elasticity to arise in the circumferential direction. However, there will only be a relatively small change in the elastic contractive stress.

Furthermore, the contractive stress will not be positioned in single spots. Instead there will be an even distribution of the elastic contractive stress on the wearer across the  
20 entire circumferential direction of the briefs. Thus, the briefs may be used by a small wearer, in which case the undulations give rise to the required elasticity, and by a larger wearer, in which case increased elasticity will occur due to the stretching of the elastic threads by the straightening of the undulations. The briefs are easy to use as they require no preceding preparation. Furthermore, the briefs will always be suited for use by a  
25 large or small wearer no matter if they have previously been expanded to their maximum extension.

The briefs according to this invention will not cause a large amount of material to occur at certain areas such as at the lateral seams, which might give rise to irritating contrac-  
30 tive stresses on the wearer and which might also make the briefs aesthetically unattractive due to the bulges occurring at these large amounts of material.

As the briefs will in any use give a largely uniform elastic tension that may be determined in advance by the number of elastic threads, the briefs will be particularly suitable as diaper fixation briefs. It will be possible to manufacture the briefs by flat knitting on traditional dual track Raschel machines or by circular knitting on traditional circular knitting machines.

In the present application the term waist portion refers to those parts being designed to envelop the wearer and extending all the way down to the crutch area between the two leg openings. The elastic threads may thus be placed across the entire height of the briefs, including areas for a waist-band for surrounding the waist of the wearer and an elastic edge area adjacent the leg openings. Thus, also waist-bands and leg cuffs will appear with the undulations and be adaptable to wearers of different sizes. In order to obtain suitable elasticity it has turned out to be advantageous in the briefs for adults to use between 10 and 20 elastic threads, preferably between 14 and 18 elastic threads.

The invention will now be explained in further detail with reference to the accompanying drawings in which

figure 1 shows an embodiment of briefs according to the invention,  
figure 2 shows a partial knitting diagram of the briefs shown in figure 1, and  
figures 3 to 5 show a partial view to illustrate the undulations of briefs according to the present invention.

Figure 1 shows a substantially rectangular front piece 1 of briefs according to the invention manufactured by flat knitting. The rectangular front piece 1 is provided overlaying a largely corresponding rear piece 2 being only visibly at leg openings 3, which are arranged on either side of an interknitted crutch area 4 at the bottom of the briefs. The briefs 1 comprise a waist portion 5 designed to envelop the wearer. The front piece 1 and the rear piece 2 are interknitted along lateral edge areas 6 to form a lateral seam 7.

The interknitting of the edge areas 6 corresponds to the interknitting made in the crutch area 4.

5 The front piece 1 and the rear piece 2 are manufactured in endless lengths on a conventional knitting machine, e.g. a Raschel knitting machine in which one of the needle tracks is used for manufacturing the front piece 1 and the other needle track is used for manufacturing the rear piece 2. The endless lengths are cut across to form separate briefs. This cut is performed in meshproof cutting lines (not shown) at either lateral edge.

10

At the top of the waist portion 5 a waist-band 8 is formed enveloping a waist opening 9. The waist-band 8 is produced in a matter known per se by means of a large number of elastic threads 10.

15 The briefs are manufactured with a number of elastic threads 11 generally extending in the circumferential direction of the waist portion. In the embodiment shown this means that the elastic threads 11 extend between the edge areas 6 of the front piece 1 and the rear piece 2, respectively. The elastic threads are able in a manner known per se to provide elastic contraction in the circumferential direction of the briefs. This ensures that  
20 the briefs fit firmly to the wearer.

Elastic threads will normally as a whole or in part constitute part of the base web of the front piece 1 and the rear piece 2, which are formed with a net-like open mesh structure. This mesh structure is well-known to a person skilled in the art and, therefore, will not  
25 be described in detail. It is also well known to use elastic threads interknitted with the base web throughout the circumferential direction of the waist portion. These known elastic threads are designated by 11'.

According to the present invention, part of the elastic threads 11 are only partially inter-  
30 knitted with the base web along the extension of the thread in the circumferential direction of the waist portion. In the embodiment shown the threads 11 are formed by yarn in

the form of highly elastic elastan interknitted with the base web to alternately form four meshes and extend freely across the subsequent four meshes formed in the base web.

5 Across the height of the waist portion a total of sixteen elastic threads 11 are used. The threads 11 are only shown on the front piece 1 but corresponding threads will be arranged on the rear piece 2. The threads 11 will give the briefs undulations to be explained later with reference to figures 3 to 5. The undulations will permit the briefs to be used with satisfactory elasticity on a small wearer and a large wearer.

10 It is in the interknitting of the elastic threads 11 into the waist portion 5 that the briefs according to the present invention differ from the briefs of the prior art. The actual interknitting of the elastic threads is shown in the knitting diagram in figure 2. It is understood that the knitting diagram of figure 2 is only partial and that it is possible to vary the extension of individual areas. Thus, the waist-band 10 may be wider or smaller,  
15 and the edge area 12 located in immediate vicinity of the leg openings 3 may also have different extensions.

It appears from the knitting diagram that the elastic threads 11 in the area 13 extending in the vertical direction 14 of the briefs 1 form meshes 15 with the remaining, base web  
20 16, and then follow an area 17 likewise oriented in the vertical direction 14 of the briefs where the threads 11 are not interknitted with the base web 16. The base web is formed with a net-like knitting of textured yarns, e.g. produced from nylon or polyester or elastan yarns.

25 In the waist band area 10 elastic yarns 18 are used in large numbers in order to form in a manner known per se a very elastic waist-band.

It is understood that the areas 13 and 17 extend across the entire height of the waist portion 1, i.e. also in the area of the waist-band 10. After knitting, the briefs will appear  
30 with undulations shown with an exaggeration in figure 3.



Figures 3 to 5 show schematically how the threads 11 and the base web 16 appear in different situations of use. Figure 3 shows a situation in which the briefs are finished and have been submitted to a fixation process known per se. In this situation the briefs are ready for use. Figure 4 illustrates a situation in which the briefs are partially stretched. i.e. a situation in which the briefs are put on a small wearer. Figure 5 shows a situation in which the briefs are widely stretched. i.e. a situation in which the briefs are put on a large wearer.

It is seen in figure 3 how undulations 19 are formed in the base web 16 of the briefs. The undulations have crests 20 in the areas 13 where the elastic threads 11 are interknitted with the base web 16. There are vales 21 in the areas 17 where the elastic threads 11 are not interknitted with the base web 16. As the elastic threads 11 are highly elastic threads, it is possible to submit them to a very substantial elongation without the exerted elastic power being increased substantially.

In the situation shown in figure 4 the elastic threads 11 are elongated, and the undulating base web 16 is partially straightened. Thus, the elasticity of the base web itself does not give much contribution to the elastic force when the briefs are used on a small wearer. This elastic force is primarily provided by stretching of the elastic threads 11.

Figure 5 shows a situation in which the base web is stretched and extends substantially parallel with the elastic threads 11. In this situation stretching occurs both in the elastic threads 11 and in the base web 16. As the base web 16 is formed with an open net-like structure, this base web 16 will have a certain elastic force. However, it is well known to a person skilled in the art that the elasticity occurring in the base web may very easily be regulated by the use of different mesh types.

It will be possible to vary the briefs of the invention. Thus, it will be possible to place the elastic threads 11 so that they extend obliquely from the crutch area in an upward and outward direction in a meandering pattern. In this manner the elastic threads may have a position corresponding to the lateral edges of a diaper. This will make the briefs

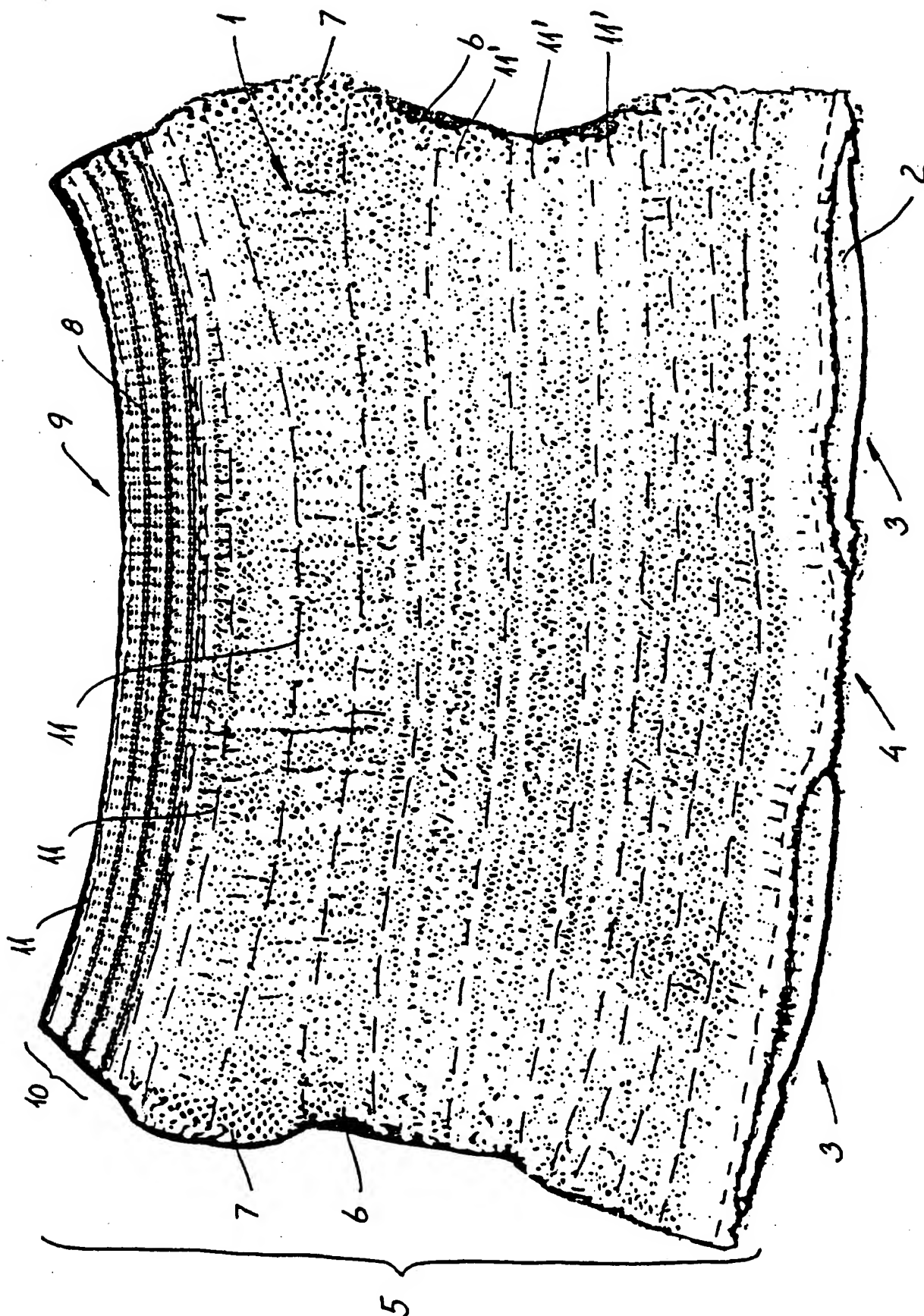
particularly useful as diaper fixation briefs. Because not only a pressure effect along the lateral edges of a diaper is obtained but also elasticity in the circumferential direction of the briefs so that they fit firmly around the waist of the wearer. However, the briefs will also be useful as diaper fixation briefs with elastic threads 11 extending in the circumferential direction in the manner illustrated in figure 1.

It will also be possible to manufacture the briefs by circular knitting. In this embodiment no lateral seams will appear. The most important feature, viz. the partial mesh formation by means of the elastic threads 11, will also be found in such an embodiment.

## CLAIMS

1. Panty briefs comprising a waist portion for enveloping a wearer, said waist portion being knitted together at an edge area in the bottom of the briefs in order to form a crutch area separating two non-united sections of the edge areas at the bottom of the briefs in order to form leg openings, said briefs being produced from a base web with elastic threads, which are distributed across the height of the waist portion and which extend generally in the circumferential direction of the waist portion in order to provide an elastic contraction in the circumferential direction of the briefs, characterised in that at least part of the elastic threads only form meshes along a portion of the extension of said threads in the circumferential direction of the briefs so as to form intermediate portions in which the base web is pressed in an outward direction for the formation of undulations.
2. Panty briefs according to claim 1, characterised in that the elastic threads are produced from smooth or wound elastan yarns.
3. Panty briefs according to claim 1, characterised in that the elastic threads are constituted of gum threads.
4. Panty briefs according to any one of the preceding claims, characterised in that between 10 and 20 elastic threads, preferably between 14 and 18 elastic threads, are used across the height of the briefs.
5. Panty briefs according to any one of the preceding claims, characterised in that the elastic threads alternately form meshes 4 times and then extend freely across the subsequent 4 meshes of the base web of the briefs.

6. Panty briefs according to any one of the preceding claims, characterised in comprising elastic threads that form meshes with the base web of the briefs along the entire circumferential direction of the briefs.
- 5 7. Panty briefs according to any one of the preceding claims, characterised in being manufactured by flat knitting.
8. Panty briefs according to any one of claims 1 to 6, characterised in being manufactured by circular knitting.
- 10 9. Panty briefs according to any one of the preceding claims, characterised in that said elastic threads are highly elastic wound yarns, preferably Lycra®.
- 15 10. The use of panty briefs according to any one of the preceding claims as diaper fixation briefs.



**Fig. 1**

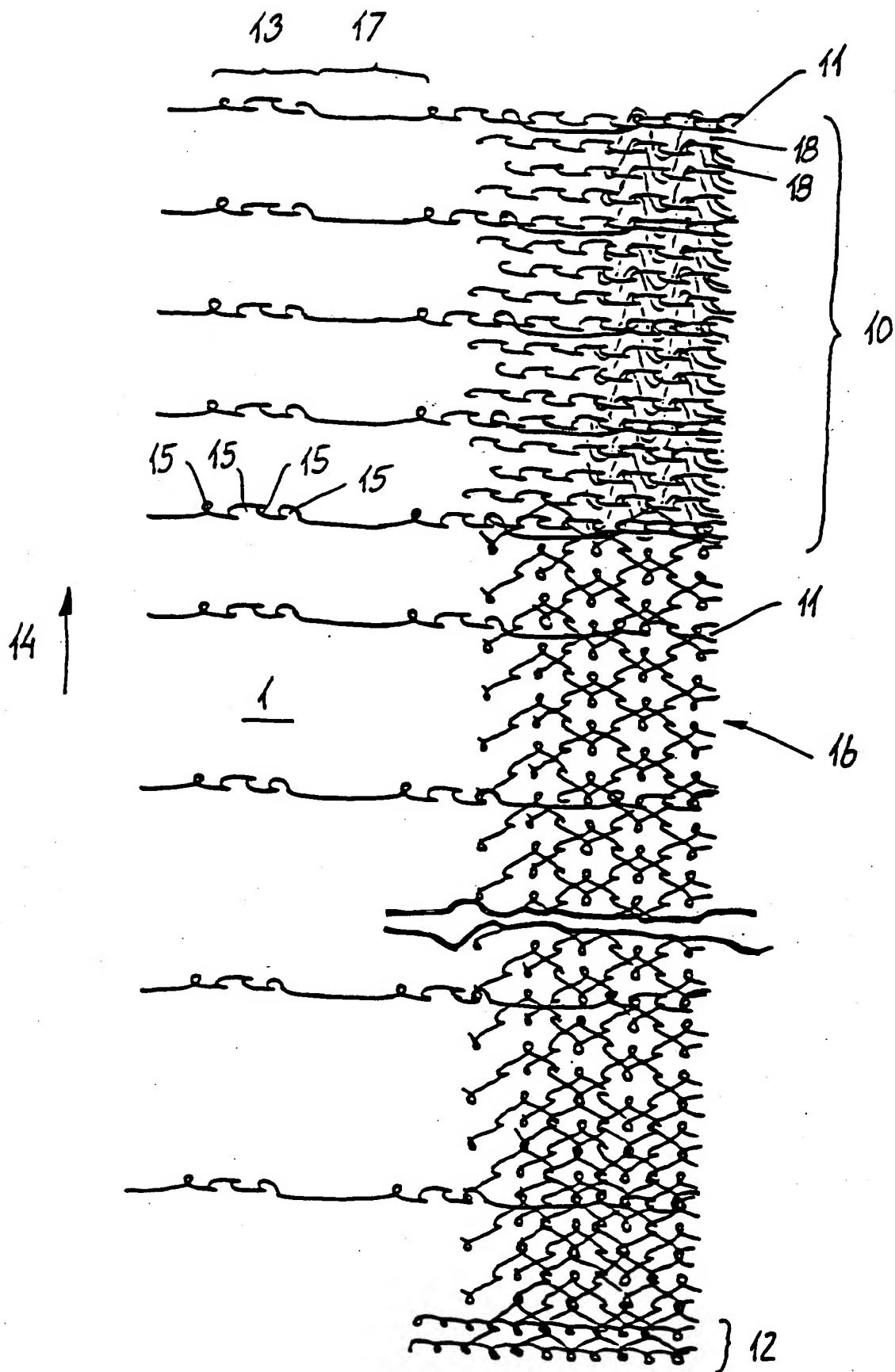
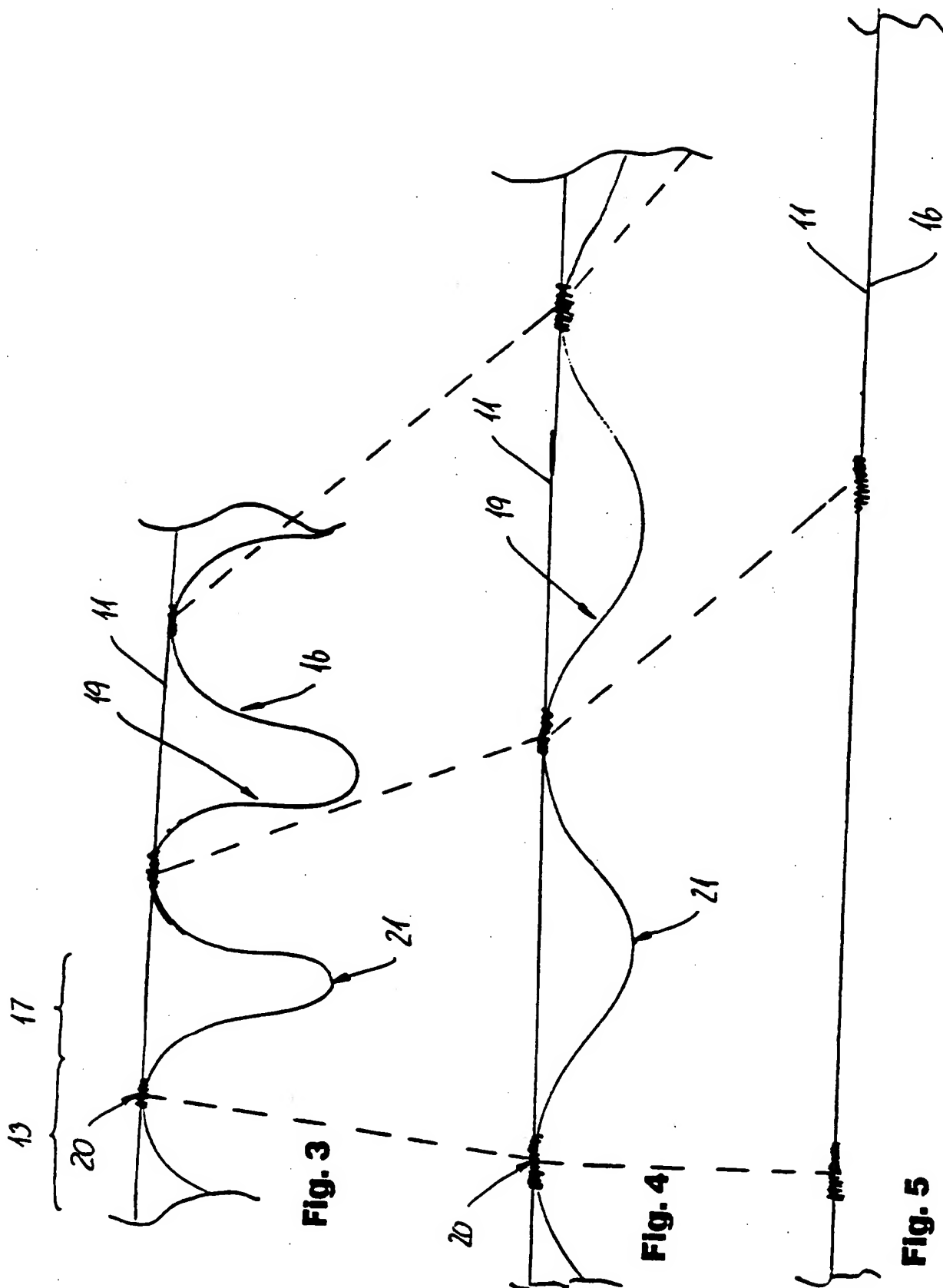


Fig. 2



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 95/00434

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A41B 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A41B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4527403 A (FULLBRIGHT ET AL), 9 July 1985 (09.07.85), column 4, line 11 - line 43, figures 1-9 --	1-10
Y	US 3016726 A (R. H. LAWSON), 16 January 1962 (16.01.62), figures 1-9, claim 1 --	1-10
Y	DE 933561 C (LOUIS BAHNER ELBEO-WERKE G.M.B.H.), 3 November 1955 (03.11.55), page 2, line 43 - line 58, figures 1-3 --	1-10
Y	DE 1920791 A (HANES CORP), 11 December 1969 (11.12.69), page 6, figures 1,2 --	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

25 March 1996

Date of mailing of the international search report

27 -03- 1996

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Kenneth Gustafsson  
Telephone No. +46 8 782 25 00



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 95/00434

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5280652 A (DAVIS ET AL), 25 January 1994 (25.01.94), column 2, line 40 - line 50, figure 3  -- -----	1-10

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

PCT/DK 95/00434

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4527403	09/07/85	NONE	
US-A- 3016726	16/01/62	NONE	
DE-C- 933561	03/11/55	NONE	
DE-A- 1920791	11/12/69	BE-A- 732672	16/10/69
		CH-A- 484639	31/01/70
		FR-A, A- 2008574	23/01/70
		GB-A- 1219734	20/01/71
		NL-A- 6907187	18/11/69
		US-A- 3487662	06/01/70
US-A- 5280652	25/01/94	EP-A- 0556068	18/08/93